the completed series of integrals of the first equation. The reader is reminded that by the completed series of integrals is meant, not all the integrals of the first partial differential equations that exist, but all that arise from a certain root integral by a certain process of derivation, together with the root integral itself. Now the answer here to be established to this inquiry is the following. The first of the partial differential equations necessarily *will*, and others *may*, be satisfied by the proposed function irrespectively of its *form*. If the number of equations of the completed system which is *not* thus satisfied is odd (this is the condition in question), the form of the function which will satisfy all is determinable by the solution of a single differential equation of the first order, capable of being made integrable by means of a factor.

Although the direct subject of this paper is the solution of partial differential equations of the first order, I wish it rather to be received as a slight contribution to that theory of the dynamical equations which was first published in the Philosophical Transactions, and which suggested to Jacobi the line of investigation which I here only seek to pursue a little further.

January 29, 1863.

Dr. WILLIAM ALLEN MILLER, Treasurer and Vice-President, in the Chair.

Mr. Henry John Carter was admitted into the Society.

The following communication was read :—

"On the Absorption of Gases by Charcoal.—No. I." By Dr. R. Angus Smith, F.R.S. Received December 27, 1862.

(Abstract.)

The following is a summary of the author's observations :—

1. Charcoal absorbs oxygen so as to separate it from common air, or from its mixtures with hydrogen and nitrogen, at common temperatures.

2. Charcoal continues the absorption of oxygen for at least a month, although the chief amount is absorbed in a few hours, sometimes in a few seconds, according to the quality of the charcoal.

3. It does not absorb hydrogen, nitrogen, or carbonic acid for the same period.

4. Although the amount absorbed is somewhat in the relation of the condensibility of the gases by pressure, this is not the only quality regulating the absorption, of oxygen at least.

5. When it is sought to remove the oxygen from charcoal by warmth, carbonic acid is formed, even at the temperature of boiling water, and slowly even at lower temperatures.

6. Charcoals differ extremely in absorbing power, and in the capacity of uniting with oxygen, animal charcoal possessing the latter property in a greater degree than wood-charcoal.

7. Nitrogen and hydrogen, when absorbed by charcoal, diffuse into the atmosphere of another gas with such force as to depress the mercury three-quarters of an inch.

8. Water expels mercury from the pores of charcoal by an instantaneous action.

9. The action of porous bodies is not indiscriminate but elective.

Theoretical Considerations.

1. The elective nature of porous bodies may be closely allied to three properties:—

   a. The condensibility of the gases.

   b. The attraction and perhaps inclination to combine.

   c. The capacity of combination.

2. In either case the attraction which results in condensation of the gas is exercised at distances greater than the distances of atoms or molecules in combination.

3. The gases in porous bodies lie in strata, the outside and more distant being less attracted than the atoms nearer the solid body.

4. We cannot separate chemical from physical attraction; but attraction may exist without its ultimate result (combination), which is distinctly chemical.

5. It is exceedingly probable that as physical attraction moves onwards to chemical combination, it produces the phenomena which have been attributed to so-called masses.

Chemical affinity is supposed to involve an attraction which is purely chemical; we have no proof of any such attraction as a separate power, we have only a proof of the combination. Attraction

may exist without the capacity of combining chemically, or, in other words, without chemical affinity. Chemical affinity (a very inappropriate term) is only known by combination; the previous attraction has never yet been shown to be of two kinds; and it seems more in accordance with Nature to diminish than to increase the number of original powers.

February 5, 1863.

Major-General SABINE, President, in the Chair.

The Earl of Caithness was admitted into the Society.

The following communication was read:—

"On the Embryogeny of *Comatula rosacea* (Linck)." By Professor WYVILLE THOMSON, LL.D., F.R.S.E., M.R.I.A., F.G.S. &c. Communicated by Professor HUXLEY. Received December 29, 1862.

(Abstract.)

After briefly abstracting Dr. W. Busch's description of the early stages in the growth of the young of *Comatula*, the author details his own observations, carried on during the last four years, on the development and subsequent changes of the larva. After complete segmentation of the yelk, a more consistent nucleus appears within the mulberry mass still contained within the vitelline membrane. The external more transparent flocculent portion of the yelk liquefies and is absorbed into this nucleus, which gradually assumes the form of the embryo larva, a granular cylinder contracted at either end and girded with four transverse bands of cilia. This cylinder increases in size till it nearly fills the vitelline sac, gradually increasing in transparency, and ultimately consisting of delicately vacuolated sarcode, the external surface transparent and studded with pyriform oil-cells, the inner portion semifluid and slightly granular.

The vitelline membrane now gives way, and, usually shortly after the escape of the larva into the water, the third ciliated band from the anterior extremity arches forwards at one point; and in the space thus left between it and the fourth band, a large pyriform depression indi-